



CTA in Emergent Cardiovascular Care

Written by Mary Mosley

Next to the established indications for computed tomography (CT) in aortic dissection and pulmonary embolism, coronary computed tomography angiography (CTA) can reliably detect and rule out coronary artery stenosis when it is expertly performed in selected, well-prepared patients presenting with acute chest pain to the emergency department (ED). Stephan Achenbach, MD, University of Erlangen-Nuremberg, Erlangen, Germany, reviewed supporting data for its use and considerations for patient selection and obtaining acceptable images.

A 64-slice or higher CT scanner is required to obtain accurate images for a reliable diagnosis. A systematic review found that 64-slice coronary CTA with good image quality had 98% sensitivity and 82% specificity to diagnose stenoses and that the median positive and negative predictive values were 91% and 99%, respectively [Paech DC, Weston AR. *BMC Cardiovasc Disord.* 2011]. Thus, normal CTA can reliably rule out disease, and no further workup is needed, stated Prof Achenbach. However, poor image quality is associated with frequent false positives.

Coronary CTA is prognostic, with an event rate close to zero in symptomatic patients without stenoses in CT. One study showed that the 30-day risk for death or myocardial infarction was 0% in 640 patients with normal CT results after discharge from the ED [Litt HI et al. *N Engl J Med.* 2012]. The rate of detecting stenosis (9.0% vs 3.5%) and discharge from the ED (49% vs 23%) was higher in the 908 patients randomized to coronary CTA versus the 462 patients randomized to standard of care. Based on the current evidence, the European Society of Cardiology guidelines for the management of acute coronary syndrome (ACS) in patients presenting without persistent ST segment elevation recommend (class IIa) that coronary CTA be considered as an alternative to invasive angiography to exclude ACS when there is a low to intermediate likelihood of coronary artery disease and when troponin and electrocardiography are inconclusive [Hamm CW et al. *Eur Heart J.* 2011].

Patient selection criteria for coronary CTA are sinus rhythm, ability to hold their breath for 6 to 10 seconds, and body weight < 120 to 130 kg. Before data acquisition, nitrates must be given and, importantly, heart rate lowered—optimally to < 60 to 65 beats per minute. About 50 to 100 mL of contrast agent is required for the scan, and the radiation exposure ranges from 1 to 15 mSv depending on the technique. Radiation exposure can be reduced further, depending on acquisition mode, tube current, and tube voltage.

The challenges with coronary CTA are image quality and availability of the technology and expertise. The logistics for 24-hour/7-day availability in the ED can be complex. It may be hard to differentiate preexisting stenoses from those that cause the current symptoms. Notably, current studies have been conducted in patients with very low risk; thus, high-risk groups remain to be studied.

High-quality coronary CTA demonstrates the anatomy of the coronary arteries and thus has an increasing role in the investigation of patients with ACS, stated Prof Achenbach, and can substitute for more elaborate, invasive workups.

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